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(54) 【発明の名称】 抗菌性セメント

(57) 【要約】

【目的】 コンクリートやモルタルの基礎素材であるセメント材に、細菌類や黴菌類或いは酵母菌類等広範囲な菌類を殺菌殺滅しえる抗菌成分を均質に分散混合させて、コンクリートやモルタルにより構築される建物や施設の内外壁面や天井面にこれら菌類による汚着や汚損を防止する抗菌性セメントを提供する。

【構成】 セメント材に、ビリジン系化合物が10乃至30%重量及びベンズイミダゾール系化合物が70乃至90%重量で構成される抗菌成分を、フライアッシュ、珪酸白土或いは珪藻土からなる分散材に吸着させたうえ、実質的な抗菌成分濃度が少なくとも300ppm以上となるような割合で分散材を分散混合させてなる構成。

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【特許請求の範囲】

【請求項1】 ピリジン系化合物が10乃至30%重量及びベンズイミダゾール系化合物が70乃至90%重量で構成される抗菌成分を、フライアッシュ若しくは珪酸白土或いは珪藻土からなる分散材に吸着させたうえ、実質的な抗菌成分濃度が少なくとも300ppm以上となるよう該分散材をセメントに分散混合させてなる抗菌性セメント。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明はコンクリートやモルタルにより構築された建物や施設の内外壁面や天井面に、細菌類や黴菌類或いは酵母菌類等の付着繁殖により招来される、シミ、斑点、変色等の汚着及びその分泌物で招来されるコンクリートやモルタルの脆化や劣化を防止する抗菌性セメントに関するものである。

【0002】

【従来技術】建物や施設等の躯体部分は強度や耐久性或いは耐火性等の面から、鉄筋コンクリート構造や鉄骨コンクリート構造等コンクリート素材が主に使用されており、而も公会堂や公園、競技場等の公共施設を初め駅、駐車場、倉庫、抗道、トンネル或いは築堤等はコスト的制約から、その内外壁面や天井面等はコンクリート打ちのままや、せいぜいその外面をモルタル仕上げをされたものである。

【0003】ところでコンクリートやモルタルは吸水性が高く且その外表面には多数の微細な凹陥部も顕在するものであるから、これら建物や施設の日光が遮断されて温暖で通風の悪い内外壁面や天井面は細菌類や黴菌類或いは酵母菌類等の恰好の付着繁殖場所となり、該菌類等の繁殖に伴いシミ、斑点或いは変色等の汚着が招来され、更には該菌類等の繁殖で排出される分泌物によりコンクリート面やモルタル面の脆化や劣化等の汚損も招来される。

【0004】これがため、現状においては該汚着や汚損が発見された場合には、次亜塩素酸ソーダや過酸化水素等の殺菌殺菌剤で洗浄除去することがなされているものの、該殺菌殺菌剤は繁殖中の菌類については殺菌殺菌できるが、既に招来されたコンクリート面やモルタル面のシミ、斑点、変色等の洗浄除去までは出来ず、且残効性に乏しく時間の経過とともに再び繁殖する危険があり、更にはその分泌物により招来されたコンクリート面やモルタル面の脆化や劣化等の汚損には全く対処できない。

【0005】

【発明が解決しようとする課題】本発明はかかる実情に鑑みなされたものであって、コンクリートやモルタルの基礎素材であるセメント材に、細菌類や黴菌類或いは酵母菌類等の広範な菌類を殺菌殺菌しえる抗菌成分を均質に分散混合させて、構築される建物や施設等のコンクリートやモルタルによる内外壁面や天井面がこれら菌類に

より汚着或いは汚損されることを防止できる、抗菌性セメントを提供することにある。

【0006】

【課題を解決する手段】上述の課題を解決するために本発明が採用した技術的手段は、ポルトランドセメントやローマンセメント或いはアルミニナセメント等の所謂単味セメント、若しくはポラソンセメントや高炉セメント等の所謂混合セメント等コンクリートやモルタルの基礎素材であるセメント材に、細菌類や酵母菌に対し殺菌性の高い2-ピリジンチオールナトリウム-1-オキシドや2、3、5、6-テトラクロル-4-(メチルスルホニル)ピリジン若しくは2-ピリジンピオール亜鉛-1-オキシド等のピリジン系化合物と、黴菌類に対し殺菌殺菌性の高い2-(4-チアゾリル)ベンズイミダゾールやメチル-1-(ブチルカーバモイル)-2-(ベンズイミダゾールカーバメイト)、或いはメチルベンズイミダゾールカーバメイト等のベンズイミダゾール系化合物とを抗菌成分とし、しかも細菌類や酵母菌類に比べて黴菌類は略2乃至4倍以上の殺菌に係る抗菌成分濃度を要する必要上、抗菌成分を細菌類及び酵母菌類の殺菌を対象とするピリジン系化合物を10乃至30%重量で、且黴菌類の殺菌を対象とするベンズイミダゾール化合物を70乃至90%重量で構成するとともに、該抗菌成分をセメント全体に亘って均質な分散混合を図る必要上、抗菌成分を吸着でき且セメント材と比重の近いフライアッシュ、珪酸白土若しくは珪藻土からなる分散材に吸着させたうえ、コンクリート若しくはモルタル等所要の骨材が混合されてその重量が増量された場合にも、細菌類や黴菌類或いは酵母菌類を殺菌殺菌しえる抗菌成分を保持させるため、実質的に抗菌成分が300ppm以上となるよう該分散材を混合させた構成に存する。

【0007】

【作用】本発明は上述の如き構成からなるため、以下のような作用を有する。即ちコンクリートやモルタル等による構築物の内外壁面や天井面等に発生する汚着や汚損は、細菌類による繁殖や黴菌類による繁殖或いは酵母菌類による繁殖等多様な菌類により招来され若しくはこれら菌類の複合により招来されるものであるが、本発明における抗菌成分にはピリジン系化合物が10乃至30%重量で構成されるため、細菌類や酵母菌類については極めて有效地に殺菌作用が発揮され、更にはベンズイミダゾール化合物が70乃至90%重量で構成されるため、黴菌類に対しても殺菌作用が有効に発揮される。

【0008】そしてかかる抗菌成分は、無機質で比重も高く且多孔性のフライアッシュ、珪酸白土或いは珪藻土からなる分散材に吸着させて混合するため、セメント材との混合に際して均質な分散混合がなされ、而も該分散材は無機質であるからセメント材との混和性にも優れ、且コンクリートやモルタルの性能も全く変化させることもない。更にセメントはコンクリートやモルタルとして

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使用される場合には、骨材との混合により略3倍乃至7倍程度に増量されて使用されるが、抗菌成分が実質的に300 ppm以上の濃度に混合されてなるため、その分散性とも相俟ってコンクリートやモルタル全体に亘って細菌類や黴菌類或いは酵母菌類を殺菌殺黴所謂抗菌する抗菌成分濃度が保持される。

【0009】

【実施例】以下に本発明の実施例を詳細に説明すれば、本発明に用いるセメント材としてはポルトランドセメントを初め天然セメント、アルミナセメント或いはローマンセメント等所謂単味セメント類や、ポゾランセメント、サントリンセメント、高炉セメント等所謂混合セメントも採用でき、更にはこれらセメント類にAE剤や減水剤或いは流動化剤等各種の混和剤が混合されたものも差し支えはない。

【0010】そして該採用しうるセメントに混合する抗菌成分としては、コンクリートやモルタルとして構築される建物や施設等の内外壁面や天井面等に発生する汚着や汚損が、これら内外壁面や天井面に付着し且繁殖する細菌類や黴菌類或いは酵母菌類によって招来されるものであり、且その繁殖に係る環境条件によってはこれら菌類が単独で或いは複合して招来される。従ってこれら菌類全体に亘って有効に殺菌殺黴作用が発揮されること、及び使用安全性やコスト面からも可能な限り微量な使用が望まれる。

【0011】ところで現状における殺菌剤や殺黴剤としては、アミド系化合物、アミン塩、第4級アンモニウム塩、ベンズイミダゾール系化合物、カーバメート系化合物、 α 、 β 不飽和カルボニル系化合物、グアニジン誘導体、有機ハロゲン系化合物、不活性塩素系化合物、ヨードプロパルギル系化合物、有機金属系化合物、フェノー

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ル類、N-ハロアルキルチオ系化合物、チオシアノ系化合物、ジチオカルバミン酸系化合物、トリアゾール系化合物、チアジアジン系化合物、ピリジン系化合物或いはチオファネートメチル系化合物等極めて多種のものが上市されているが、これら殺菌剤殺黴剤は特定の菌類については有効性を示すものの細菌類、黴菌類或いは酵母菌類等全般に亘る抗菌スペクトルを有するものではなく、而もその有効性の高い物ほど毒性も高く特に建物や施設等の内部空間に使用することは、安全性の面からも危惧される。

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【0012】そこで発明者等は、比較的安全性の高い殺菌剤殺黴剤を効果的に組合せて広範囲の菌類に抗菌性を発揮しえる抗菌成分の実現のため、ピリジン系化合物及びベンズイミダゾール化合物に着目したものである。即ちピリジン系化合物としては2-ピリジンチオールナトリウム-1-オキシドや2、3、5、6-テトラクロル-4-(メチルスルホニル)ピリジン或いは2-ピリジンピオニール亜鉛-1-オキシドが挙げられ、更にベンズイミダゾール系化合物としては2-(4-チアゾリル)ベンズイミダゾールやメチル-1-(ブチルカーバモイル)-2-ベンズイミダゾールカーバメート或いはメチルベンズイミダゾールカーバメイトが挙げられるが、ピリジン系化合物の2、3、5、6、-テトラクロル-4-(メチルスルホニル)ピリジンと、ベンズイミダゾール系化合物の2-(4-チアゾリル)ベンズイミダゾールとの細菌類や黴菌類及び酵母菌類に対しての抗菌性を最少発育阻止濃度所謂MIC値についてみると表1の結果となる。

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【0013】

【表1】

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	菌名	抗菌成分とMIC値 (ppm)	
		ピリジン系化合物	ベンズイミダゾール系化合物
黴 菌 類	<i>Aspergillus niger</i>	30	10
	<i>Aspergillus flavus</i>	60	15
	<i>Penicillium citrinum</i>	55	15
	<i>Mucor spinescens</i>	20	10
	<i>Cladosporium resinae</i>	30	5
	<i>Pullularia pullulans</i>	30	10
	<i>Trichoderma T-1</i>	80	15
	<i>Chaetomium globosum</i>	25	5
	<i>Fusarium moniliforme</i>	60	15
細 菌 類	<i>Bacillus subtilis</i>	15	140
	<i>Bacillus cereus</i>	5	10
	<i>Escherichia coil</i>	2	8
	<i>Enterobacter aerogenes</i>	10	160
	<i>Pseudomonas aeruginosa</i>	5	10
	<i>Pseudomonas fluorescens</i>	8	15
	<i>Staphylococcus aureus</i>	3	8
酵 母 菌 類	<i>Candida albicans</i>	20	180
	<i>Rhodotorula minuta</i>	10	10
	<i>Rhodotorula mucilaginos</i>	10	15
	<i>Rhodotorula texensis</i>	10	10
	<i>Saccharomyces cerevisiae</i>	30	165

【0014】この結果からも明かなように、ピリジン系化合物は細菌類や酵母菌類については微量の抗菌成分でも顕著な抗菌作用が発揮されるが、黴菌類に対しては抗菌性が著るしく劣る。反面ベンズイミダゾール系化合物は黴菌類に対しては比較的微量の抗菌成分で顕著な抗菌作用が発揮されるものの、細菌類や酵母菌類の特定種については著しく抗菌性が劣るものが散見される。

【0015】従って表1のMIC値より、細菌類や黴菌類或いは酵母菌類全般に亘って抗菌性を効果的に発揮させるには、ピリジン系化合物の抗菌性と、ベンズイミダゾール系化合物の抗菌性とを共用することが示唆され、更に最少発育阻止濃度において細菌類及び酵母菌に対する阻止濃度と、黴菌類に対する阻止濃度との間には略4*

*乃至8倍程度の濃度を要することも示唆されることから、抗菌成分としてはピリジン系化合物が10乃至3040%重量ベンズイミダゾール系化合物70乃至90%重量の構成が、菌類全般に亘って抗菌性を有効に発揮しえる抗菌成分として提案される。

【0016】而してなる抗菌成分は、常温状態においては結晶微粉状のものであり且その比重も略1.0程度と軽く、他方混合されるセメント材はその比重が略3.0程度と重く直接セメント材に混合混練させた場合には比重差によって均質な分散混合がなされず、当然にコンクリートやモルタルとしての使用において菌類の繁殖これに伴う汚着や汚損の問題を抱える。

【0017】そこで該抗菌成分をセメント材と均質に分

散混合を図るうえから、セメント材に近い比重を有し且混合によってもコンクリートやモルタルの物性に影響を与える、而も該抗菌成分を乾燥状態においても十分に吸着若しくは添着しえる素材としてフライアッシュ、珪酸白土或いは珪藻土からなる分散材が採用される。即ち該分散材として採用したフライアッシュ、珪酸白土或いは珪藻土は無機質で比重も略2.4乃至3.0程度とセメント材に近く、且微粉粒状で表面積が多く而も多孔質であるから抗菌成分の吸着性に優れてもセメントとの混和性にも極めて優れていることによる。

【0018】分散材への抗菌成分の吸着手段としては相互を機械的に混練吸着させる方法を初め、抗菌成分を一旦適宜の溶媒で溶解させ分散材に吸着させて乾燥させる方法、或いは極めて低濃度の水溶性接着剤を介して分散材に吸着させたうえ乾燥させる方法等が適宜選択できる。因みに分散材のフライアッシュ及び珪藻土と、微粉状抗菌成分とを回転ミキサーで15分間ミキシングした後の吸着量を調べてみると、フライアッシュ1000gに対して抗菌成分の吸着量は384g、珪藻土1000gに対して抗菌成分吸着量は420gであり、更にフライアッシュ及び珪藻土にポリビニルアルコール5%水溶液を介して吸着させたうえ80°C1時間乾燥後の吸着量は、フライアッシュ1000gに対し抗菌成分吸着量は740g、珪藻土1000gに対し抗菌成分吸着量は855gである。

【0019】かかる如く抗菌成分を吸着させてなる分散

材をセメント材に混合させるに際し、セメント材がコンクリートやモルタルとして建物や施設等を構築する場合砂や砂利等の骨材を混合して略3乃至7倍程度に增量されて使用されるものであるから、かかる增量に伴い希釈される抗菌成分濃度においても細菌類や黴菌類或いは酵母菌類に十分な抗菌性を発揮させるうえから、抗菌成分が実質的に350ppm以上に保持される割合で分散材を混合してやれば良い。

【0020】

- 10 【発明の効果】以上説明した如く、本発明はセメント材に混合される抗菌成分がピリジン系化合物が10乃至30%重量及びベンズイミダゾール系化合物が70乃至90%重量で構成されてなるため、細菌類や酵母菌類にはピリジン系化合物が効率良く抗菌し且黴菌類に対してはベンズイミダゾール系化合物が効率良く抗菌するから菌類全般に亘って効果的な抗菌がなされ、而も該抗菌成分をセメント材の比重に近く且セメントと混和性に優れる分散材に吸着させたうえ混合させるため、セメント材全体に均質に分散混合されコンクリートやモルタルとして使用する場合にも、これらコンクリートやセメント全体が均質な抗菌性を発揮する。更にセメント材には抗菌成分が実質的に3000ppm以上に混合されるから、コンクリートやモルタルとして增量され使用される場合にも十分な抗菌成分濃度が保持される等極めて特徴の多い抗菌性セメントである。

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ABSTRACT:

PURPOSE: To obtain antibacterial cement for preventing the inner and outer wall surfaces and the ceiling surface in a building and a facility constructed by concrete and mortar from being stained by bacteria or the like by uniformly dispersing and mixing an antibacterial component for sterilizing microorganisms of wide range such as bacteria, germs or yeast fungi in and with a cement material which is a base raw material of concrete or mortar.

CONSTITUTION: An antibacterial cement is formed by adsorbing, on a dispersing agent consisting of fly ash, diatomaceous clay or diatomaceous earth, an antibacterial component constituted of 10-30wt.% of pyridine compound and 70-90wt.% of benzimidazol before dispersing and mixing the dispersing agent in and with a cement material at a such ratio that the substantial concentration of the antibacterial component is at least ≥300ppm.

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CLAIMS

[Claim(s)]

[Claim 1] Antibacterial cement which makes cement come to carry out distributed mixing of this distributed material so that substantial antibacterial constituent concentration may be set to at least 300 ppm or more, after a pyridine system compound makes the antibacterial component by which 10 thru/or 30% weight, and a benzimidazole system compound are constituted from 70 thru/or 90% weight stick to the distributed material which consists of fly ash, a clay silicate, or diatomaceous earth.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the antibacterial cement which prevents embrittlement and degradation of the concrete and mortar which are invited with ** arrival, such as the silverfish and the spot which are invited to the inside-and-outside wall surface and head-lining side of the building built with concrete or mortar or a facility by adhesion propagation of bacteria, a bacilli or yeast fungi, etc., etc., and discoloration, and the secrete of those.

[0002]

[Description of the Prior Art] As for main part parts, such as a building and a facility, concrete materials, such as a reinforced concrete construction from fields, such as reinforcement, and endurance or refractoriness, and steel framed concrete structure, are mainly used, and ** is also carried out [external surface / the] in mortar finishing at most, at first be [about public facilities, such as a public hall, and a park, a stadium, / from cost-constraint / a skin, the head lining side of a station, a parking lot, a warehouse, an anti-path, a tunnel, or embankment, etc. / concrete placing / continue].

[0003] by the way, concrete and mortar -- absorptivity -- high -- **, since it carries out actual [of many detailed cavities] to the outside surface The daylight of these buildings or a facility is intercepted, it is warm and the bad inside-and-outside wall surface and head-lining side of ventilation serve as suitable adhesion breeding area places, such as bacteria, and bacilli or yeast fungi. ** arrival, such as silverfish, a spot, or discoloration, is invited with propagation of this fungus etc., and dirt of embrittlement of a concrete side or a mortar side, degradation, etc. is also invited with the secrete further discharged by propagation of this fungus etc.

[0004] Although carrying out washing removal by antimicrobial and antifungal agent, such as sodium hypochlorite and a hydrogen peroxide, is made when this accumulates and this ** arrival and dirt are discovered in the present condition, about the fungus under propagation, this antimicrobial and antifungal agent antimicrobial and antifungal ***** Washing removal of the silverfish of the already invited concrete side or a mortar side, a spot, discoloration, etc. cannot be performed. Risk of breeding again with the passage of time deficiently is in *****, and dirt of embrittlement of the concrete side further invited with the secrete or a mortar side, degradation, etc. cannot be coped with at all.

[0005]

[Problem(s) to be Solved by the Invention] This invention be make in view of this actual condition , carry out extensive funguses , such as bacteria , and bacilli or yeast fungi , at the cement material which be a basic material of concrete or mortar , homogeneity be make to carry out distributed mixing of the antimicrobial and antifungal ***** antibacterial component , and the inside and outside wall surfaces and head lining sides by concrete or mortar , such as a building build and a facility , be to offer the antibacterial cement which can prevent ** arrival or be soil by these funguses .

[0006]

[Means for Solving the Problem] The technical means which this invention adopted in order to solve an above-mentioned technical problem The so-called simple cement, such as Portland cement, and Roman cement or alumina cement, To or the cement material which is the basic materials of concrete or mortar, such as the so-called blended cement, such as PORAZON cement and Portland blast furnace cement As opposed to bacteria or a yeast fungus Pyridine system compounds, such as disinfectant high 2-pyridine thiol sodium-1-oxide, and a 2, 3, 5, and 6-tetra-KURORU-4-(methyl sulfonyl) pyridine or 2-pilus JIMPI all zinc-1-oxide, As opposed to bacilli High 2-(4-thiazolyl) benzimidazole of antimicrobial and antifungal nature, and methyl-1-(butyl carver moil)-2- (benzimidazole carver mate), Or benzimidazole system compounds, such as a methylbenzimidazol carver mate, are used as an antibacterial component. And they are 10 thru/or 30% weight about the pyridine [component / antibacterial] system compound for sterilization of bacteria and yeast fungi on the need that bacilli require the antibacterial constituent concentration concerning abbreviation 2 thru/or **** of 4 times or more compared with bacteria or yeast fungi. While constituting the benzimidazole compound for **** of a **** fungus from 70 thru/or 90% weight The need [of covering the whole

cement in this antibacterial component, and aiming at homogeneous distributed mixing] top, and an antibacterial component can be adsorbed. Fly ash with near ** cement material and specific gravity, Also when the necessary aggregates, such as concrete or mortar, are mixed and the quantity of the weight is increased after making it stick to the distributed material which consists of a clay silicate or diatomaceous earth In order to make the antibacterial component which can carry out antimicrobial and antifungal **** antibacterial [of bacteria, bacilli, or the yeast fungi] hold, it consists in the configuration which mixed this distributed material so that an antibacterial component might be substantially set to 300 ppm or more.

[0007]

[Function] Since this invention consists of a configuration like ****, it has the following operations. Namely, although the ** arrival and dirt which are generated in an inside-and-outside wall surface, a head-lining side, etc. of a structure by concrete, mortar, etc. are invited by various funguses, such as propagation by bacteria, and propagation by bacilli or propagation by yeast fungi, or are invited by compound of these funguses Since a pyridine system compound is constituted from 10 thru/or 30% weight by the antibacterial component in this invention, Since a germicidal action is demonstrated very effectively about bacteria or yeast fungi and a benzimidazole compound consists of 70 thru/or 90% weight further, a fungicidal operation is effectively demonstrated also to bacilli.

[0008] And since this antibacterial component is made to stick to the distributed material which consists of the fly ash, the clay silicate, or diatomaceous earth of ***** highly [specific gravity] and mixes with minerals, homogeneous distributed mixing is made on the occasion of mixing with cement material, since these distributed material is minerals, ** is also excellent also in a miscibility with cement material, and it completely does not change [**] the engine performance of ** concrete or mortar, either. Furthermore, the antibacterial constituent concentration which the dispersibility covers concrete and the whole mortar conjointly since the concentration of 300 ppm or more comes to mix an antibacterial component substantially, although mixing with the aggregate uses it, increasing at a 3 times as many abbreviation as this thru/or about 7 times when cement is used as concrete or mortar, and carries out antimicrobial and antifungal **** antibacterial [of bacteria bacilli, or the yeast fungi] is held.

[0009]

[Example] If the example of this invention is explained below at a detail, as cement material used for this invention, the so-called blended cement, such as the so-called simple cement, and Pozzolan cement, sandtorin cement, Portland blast furnace cement, such as natural cement, alumina cement, or Roman cement, can also adopt Portland cement at first, and inconvenience will not have that with which various kinds of admixture, such as an AE agent, and a water reducing agent or a plasticizer, was further mixed by these cement, either.

[0010] and the thing invited by bacteria, the bacilli, or the yeast fungi which the ** arrival and the dirt which are generated as an antibacterial component mixed with the this cement which can be adopted in inside-and-outside wall surfaces, head-lining sides, etc., such as a building built as concrete or mortar and a facility, adhere and ***** to these inside-and-outside wall surface or a head-lining side -- it is -- ** -- the environmental condition concerning the propagation -- these funguses -- independent -- or it is compounded and invited. Therefore, the minute amount possible use is desired also from that cover these whole funguses and an antimicrobial and antifungal operation is demonstrated effectively, and operating safety and a cost side.

[0011] by the way, as the germicide in the present condition, or a fungicide An amide system compound, an amine salt, quaternary ammonium salt, a benzimidazole system compound, A carver mate system compound, alpha, beta partial saturation carbonyl system compound, a guanidine derivative, An organic halogen system compound, an inactive chlorine-based compound, an iodine propargyl system compound, Although Kamiichi of the various things is carried out extremely, an organic metal system compound, phenols, N-halo alkylthio system compound, thio cyano compound, a dithiocarbamic acid system compound, a triazole system compound, a thiadiazin system compound, a pyridine system compound, or a thiophanate-methyl system compound These germicide fungicide is not what has an antimicrobial spectrum covering bacteria, bacilli, or yeast fungi at large although effectiveness is shown about a specific fungus. It is apprehensive about toxicity being also especially high and an object with the higher effectiveness using ** for building envelopes, such as a building and a facility, also from the field of safety.

[0012] Then, an artificer etc. pays his attention to a pyridine system compound and a ** NZUIMIDAZORU compound for implementation of the antibacterial component which can demonstrate antibacterial to a wide range fungus, combining a germicide fungicide with comparatively high safety effectively. Namely, as a pyridine system compound, 2-pyridine thiol sodium-1-oxide, and a 2, 3, 5, and 6-tetra-KURORU-4-(methyl sulfonyl) pyridine or 2-pyridine Young Pioneers zinc-1-oxide is mentioned. Furthermore, although 2-(4-thiazolyl) benzimidazole, and a methyl-1-(butyl carver moil)-2-benzimidazole carver mate or a methylbenzimidazol carver mate is mentioned as a benzimidazole system compound 2, 3, 5 and 6 of a pyridine system compound, and a - tetra-KURORU-4-(methyl sulfonyl) pyridine, If it sees antibacterial [over bacteria, bacilli, and yeast fungi with 2-(4-thia sol) benzimidazole of a benzimidazole system compound] about a minimum growth inhibition concentration **** Media Interface Connector value, a result of Table 1 will be brought.

	菌名	抗菌成分とMIC値 (ppm)	
		ピリジン系化合物	ベンズimidazole系化合物
微生物類	<i>Aspergillus niger</i>	30	10
	<i>Aspergillus flavus</i>	60	15
	<i>Penicillium citrinum</i>	55	15
	<i>Mucor spinescens</i>	20	10
	<i>Cladosporium resinae</i>	30	5
	<i>Pulluraria pullulans</i>	30	10
	<i>Trichoderma T-1</i>	80	15
	<i>Chaetomium globosum</i>	25	5
細菌類	<i>Fusarium moniliforma</i>	60	15
	<i>Bacillus subtilis</i>	15	140
	<i>Bacillus cereus</i>	5	10
	<i>Escherichia coil</i>	2	8
	<i>Enterobacter aerogenes</i>	10	160
	<i>Pseudomonas aeruginosa</i>	5	10
	<i>Pseudomonas fluorescens</i>	8	15
酵母菌類	<i>Staphylococcus aureus</i>	3	8
	<i>Candida albicans</i>	20	180
	<i>Rhodotorula minuta</i>	10	10
	<i>Rhodotorula mucilaginos</i>	10	15
	<i>Rhodotorula texensis</i>	10	10
	<i>Saccharomyces cerevisiae</i>	30	165

[0014] Like [also from this result, it is ***** and], for a pyridine system compound, although a remarkable antibacterial action is demonstrated also of the antibacterial component of a minute amount about bacteria or yeast fungi, to bacilli, antibacterial is *****. That to which antibacterial is inferior in a opposite side benzimidazole system compound remarkably about the specific seed of bacteria or yeast fungi although a remarkable antibacterial action is comparatively demonstrated of the antibacterial component of a minute amount to bacilli appears here and there.

[0015] Therefore, in order to cover yeast fungi bacteria, bacilli, or at large and to demonstrate antibacterial effectively from the Media Interface Connector value of Table 1 Inhibition concentration [as opposed to / in / further / sharing antibacterial / of a pyridine system compound / and antibacterial / of a benzimidazole system compound / is suggested, and / the minimum growth inhibition concentration / bacteria and a yeast fungus], From being suggested, requiring abbreviation 4 thru/or about 8-time concentration between the inhibition concentration to bacilli As an antibacterial component, a pyridine system compound is proposed as an antibacterial component which 10 30% weight benzimidazole system compound 70 thru/or the configuration of 90% weight cover a fungus at large, and can demonstrate antibacterial effectively.

[0016]-The specific gravity is also as light as about 1.0 abbreviation. the antibacterial component which comes to ** -- an ordinary temperature condition -- setting -- a crystal fines-like thing -- it is -- ** -- When the specific gravity makes direct cement material carry out mixed kneading heavily with about 3.0 abbreviation, homogeneous distributed mixing is not made according to a specific gravity difference, but naturally the cement material by which another side mixing is carried out has propagation of a fungus, and the ** arrival accompanying this and the problem of dirt in the use as concrete or mortar.

[0017] Then, from from [in aiming at distributed mixing for this antibacterial component to cement material and homogeneity], it has the specific gravity near cement material, and the distributed material which consists of fly ash, a clay silicate, or diatomaceous earth as a material which the physical properties of concrete or mortar are not affected, but ** also sets this antibacterial component to dryness, and can fully be adsorbed or installed also by ***** is adopted. namely, the fly ash, the clay silicate, or diatomaceous earth adopted as this distributed material -- minerals -- specific gravity -- abbreviation 2.4 thru/or about 3.0 and cement material -- near and ***** -- it is granular and surface area is because it is excellent in adsorbent [of an antibacterial component] since ** is also porosity, and ** is also extremely excellent also in a miscibility with cement mostly.

[0018] The approach of drying, after making it stick to distributed material through the approach of dissolving the approach of carrying out kneading adsorption of mutual mechanically as an adsorption means of the antibacterial component to distributed material, making once dissolve an antibacterial component with a proper solvent first, making stick to distributed material, and drying, or water-soluble, very low-concentration adhesives etc. can choose suitably. If the amount of adsorption after mixing the fly ash of distributed material and diatomaceous earth, and a fines-like antibacterial component for 15 minutes by the rotation mixer incidentally is investigated The antibacterial component amount of adsorption of the amount of adsorption of an antibacterial component is 420g to 384g and 1000g of diatomaceous earth to fly ash 1000g. Furthermore, after making it stick to fly ash and diatomaceous earth through a polyvinyl alcohol 5% water solution, the amount of adsorption after 80-degree-C 1-hour desiccation is [the antibacterial component amount of adsorption of the antibacterial component amount of adsorption] 855g to 740g and 1000g of diatomaceous earth to fly ash 1000g.

[0019] It is made to face the distributed material to which make an antibacterial component come to stick so that it may start that cement material is mixed. Since the aggregates, such as sand and ballast, are mixed, and abbreviation 3 thru/or about 7 times use it for them, increasing when cement material builds a building, a facility, etc. as concrete or mortar What is necessary is just to mix distributed material at a rate that an antibacterial component is held substantially at 350 ppm or more, from from [in demonstrating antibacterial / for bacteria, bacilli, or yeast fungi / sufficient / also in the antibacterial constituent concentration diluted with this increase in quantity].

[0020]

[Effect of the Invention] Since it comes for a pyridine system compound to consist of 10 thru/or 30% weight, and a benzimidazole system compound 70 thru/or 90% weight for the antibacterial component with which this invention is mixed by cement material as explained above, Since a pyridine system compound carries out antibacterial efficiently and a benzimidazole system compound carries out antibacterial efficiently to ***** to bacteria or yeast fungi, he covers a fungus at large and antibacterial [effective] should do. In order to make it mix after making the distributed material which will be excellent in the specific gravity of cement material soon at ** cement and a miscibility adsorb this antibacterial component also to **, also when distributed mixing is carried out and it uses it for homogeneity as concrete or mortar at the whole cement material, it demonstrates antibacterial [with homogeneous these whole concrete or cement]. Furthermore, since an antibacterial component is substantially mixed by 3000 ppm or more at cement material, also when it increases as concrete or mortar and is used, it is antibacterial cement with very many descriptions -- sufficient antibacterial constituent concentration is held.

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